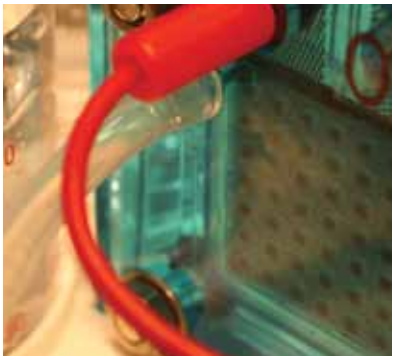

MARCH 1 - 3
GAYLORD CONVENTION CENTER
WASHINGTON DC

ENERGY INNOVATION SUMMIT

Supporting America's Breakthrough Energy Innovators

Showcase Abstract Directory

The Energy Innovation Summit has been produced by NSTI with key support by CTSI, NVCA and Kauffman Foundation. Participation as a sponsor or exhibitor in the Energy Innovation Summit does not necessarily imply any affiliation with or endorsement by ARPA-E or the U.S. Department of Energy.

CTSI
Clean Technology and Sustainable Industries Organization

With Key Support from:

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(320) 1366 Technologies
Frank van Mierlo
mierlo@1366tech.com
www.1366tech.com
1366 will develop a breakthrough "Direct Wafer" manufacturing technology to form high efficiency solar silicon wafers directly from the silicon melt at 1/5th the cost of the current standard. These next generation wafers have the potential to decrease the amount of expensive silicon material needed by a factor of > 3 and to decrease installed solar power system costs by a factor of ~2. By addressing silicon solar's key limitations, Direct Wafer will spawn a US silicon solar manufacturing industry with significant global market potential. 1366 plans to build a commercial factory in 2012.

(102) 3M Corporation
Daniel Chen
dtchen@mmm.com
www.3m.com
The technology is a reflective film based panel reflector for Concentrated Solar Power (CSP) applications that combines high reflectivity and stiffness. This combination enables large aperture CSP geometries, raising system efficiencies while reducing system cost.

(104) Achates Power, Inc.
Larry Fromm
fromm@achatespower.com
www.achatespower.com
Achates Power is developing a radically different flexible-fuel engine that is fuel-efficient, clean, and cost-effective. The Achates Power A40 engine family optimizes fuel economy through increased thermal efficiency and reduced friction. The innovative design of the engine reduces cost and weight by minimizing or eliminating traditional engine components such as the cylinder heads. The company – an ARPA-E finalist -proposed an engine with an integrated linear generator for PHEVs.

(108) Adesto Technologies Corporation
Ed McKernan
ed.mckernan@adestotech.com
www.adestotech.com
Adesto is a Silicon Valley semiconductor company developing a new ultra low power, non-volatile memory called CBRAM. CBRAM is designed to replace high-powered DRAM in servers and to enable energy-starved, mobile applications. CBRAM is much lower power and lower cost than today's Flash. In 2009, Adesto won a DARPA award to demonstrate the sub-threshold voltage operation of its CBRAM. Adesto will enter the market with its first commercial NVM chip later in 2010.

(331) Ag-Oil
Brian Weprin
brian.weprin@ag-oil.com
www.ag-oil.com
Ag-Oil, a green company with its corporate offices in Boca Raton, Florida is building a demonstration scale renewable diesel facility in Palm Beach County. Leading-edge oil producing technologies using the high yielding jatropha crop as the primary feedstock will allow the project to outperform conventional oil production facilities. Currently, Ag-Oil, in partnership with the University of Florida is developing a proprietary jatropha cultivar that is both non-toxic and cold tolerant.

(219) Agrivida, Inc.
Jeremy Johnson
www.agrivida.com
Agrivida, Inc., will develop an innovative technology to produce 'masked' cell wall degrading enzymes within the plant itself that can be activated after harvest, dramatically reducing the cost of cellulosic biofuels and biochemicals. The technology will help establish a sustainable market for non-food biomass resources to bolster the development of biorefinery jobs and commerce and create carbon neutral transportation fuels.

(216) Algaeventure Systems
Ross O. Youngs
dcoho@algaevs.com
www.algaevs.com
Univenture / Algaeventure Systems (AVS) has demonstrated an innovative technology for removing the water from suspended algae. This technology dramatically reduces energy consumption by utilizing surface physics and capillary action to more effectively harvest, dewater, and dry algae (HDD).

(100) American Council On Renewable Energy (ACORE)
Jeramy Shays
shays@acore.org
www.acore.org
ACORE, a 501(c)(3) membership nonprofit organization headquartered in Washington, D.C., is dedicated to bringing renewable energy into the mainstream of the US economy through information and communications programs. ACORE provides a platform for the range of interests in the renewable energy community including manufacturers, associations, utilities, end users, professional service firms, financial institutions and government agencies. Membership information is available at: www.acore.org.

(338) American Superconductor Corporation
Bruce Gamble
bgamble@amsc.com
www.amsc.com
The inability of the existing transmission system to move electricity from the resource rich, but often sparsely populated parts of the country, to population centers remains a primary barrier to achieving the 20-30% renewable energy goal by 2030. New technologies are available today that can transform how we move electric power across the Nation. Superconductor Electricity Pipelines utilize power cables made with superconductor wire made right here in the U.S.A. and this technology has been developed and proven over the last two decades. (...)

(340) American Superconductor Corporation
Bruce Gamble
bgamble@amsc.com
www.amsc.com
Wind turbine power ratings have been increasing steadily while the price per megawatt has declined, enabling wind power to achieve economic parity with conventional generation sources in prime wind locations. Due to the limitations of conventional technologies, however, the largest wind turbine ratings top out at approximately 6 MW due in part to practical limitations on the physical size and weight of the generators that must be transported over roads and supported on towers hundreds of feet in the air. (...)

(220) Arizona State University
Wim Vermaas
wim@asu.edu
www.biodesign.asu.edu/research/projects/solar-powered-biofactory/
This project uses metabolic engineering to maximize solar-energy-fueled fatty acid production and secretion in Synechocystis sp. PCC 6803, a cyanobacterium. In physiologically competent stationary-phase cultures harvested energy is used for fatty acid synthesis rather than for biomass growth. Cyanobacteria thus become biocatalysts (mini factories) producing fatty acids from CO2 and light. Produced fatty acids are decarboxylated and converted to liquid transportation fuels by the Centia process.

(218) Arizona State University
Wim Vermaas
wim@asu.edu
sols.asu.edu/people/faculty/wvermaas.php
This project aims at a new paradigm: sunlight-driven production of isoprene without significant growth and biomass production. Equipping cyanobacteria with the isoprene synthase gene enables production of isoprene from CO2 and sunlight using the photosynthetic and metabolic pathways of the cyanobacteria. This will reduce the need for fossil fuels for isoprene production, and defines a new high-efficiency platform for production of biofuels via photosynthetic microorganisms.

(112) Athena Biotechnologies, Inc
Barry Marrs
bmarrs@athenabio.com
www.athenabio.com
Athena Biotechnologies, Inc. is using proprietary technology (MYGE™) to achieve a 50% increase in ethanol yield per unit of feedstock and decrease all feedstock-related costs, both direct and imputed, by as much as 33%. Furthermore, since MYGE™ greatly reduces CO2 production in the fermentor, the downstream distillation chain is relieved of the processing the large mass of CO2, and thus is expected to become significantly more efficient. AthenaBio seeks resources for developing its MYGE™ technology.

(114) Bandgap Engineering, Inc.
Chris Hobson
chris@bandgap.com
www.bandgap.com
Bandgap has pioneered the development of highly tunable and inexpensive methods for nano-structuring silicon and is applying these technologies to high efficiency photovoltaic systems and high capacity Li-ion batteries.

(314) Bio Architecture Lab, Inc. (BAL)
Nikesh Parekh
nikesh@ba-lab.com
www.ba-lab.com
Bio Architecture Lab (BAL) is a pioneer in the application of synthetic biology and enzyme design to the development of biofuels and renewable chemicals from aquafarmed, native macroalgae (seaweed), which is a low cost, scalable, and sustainable biomass. Aquafarmed macroalgae does not compete with food, does not require land or fresh water, and is beneficial to the ocean environment.

(116) BrightEarth Technologies, Inc.
Scott Frazier
scott@bright-caes.com
www.bright-caes.com
Energy, as compressed air, is stored in a thin bag at the bottom of a body of water. The bag is inexpensive because hydrostatic water pressure restrains the compressed air. Reheating during expansion with nearby water eliminates the need for fossil fuel as used in conventional CAES. Unique IP has been created around the bag design & deployment and a compressor/expander that is bidirectional, inexpensive & efficient. Costs under $50/kWH transform renewable energy project economics.

(118) Catacel Corp.
William A. Whittenberger
ngreenway@catacel.com
www.catacel.com
Catacel is the unsurpassed authority on metal foil catalytic heat exchange solutions. Catacel's catalytic materials and devices are used globally for high-throughput reactions in fuel cell, gas-to-liquid, combustion and hydrogen production systems. Catacel's foil-based heat-exchanging reactor technology can be used to support novel sorbent materials to provide a cost effective CO2 capture system. This system is the first to provide a mechanism for supporting these materials that overcomes the physical challenges of using them in the exhaust of power plants.

(124) CellTech Power LLC
Jeff Bentley
jbentley@celltechpower.com
www.celltechpower.com
CellTech's Liquid Tin Anode (LTA) delivers the efficiency and low cost that has long been promised by fuel cell technology. LTA technology generates power directly using virtually any hydrocarbon source including coal, biomass, diesel and natural gas. These solutions are scalable from under 100 Watts to over 100 MW creating multiple platforms to address power generation needs.

(110) Ceres, Inc.
Steve Bobzin
sbobzin@ceres-inc.com
www.ceres.net/
Using advanced plant breeding and biotechnology, Ceres, Inc. is developing Dedicated Energy Crops (DECs) as feedstocks for advanced biofuels and biopower applications. Ceres has been awarded a $5M ARPA-E grant to investigate 4 nitrogen use efficiency traits in 3 DECs: switchgrass, miscanthus, and sorghum. Field trials in 4 states will determine suitability for large scale cultivation to provide feedstocks for bioenergy, and to determine the benefits on GHG and environmental goals.

(342) College of William and Mary
Erik Spahr and Gunter Luepke
erik.spahr@gmail.com
Our novel photo-enhanced solid oxide fuel cells use infrared light to significantly lower operating temperatures, reduce start-up times, enhance performance and increase device lifetime. The basic principle is similar to how a microwave oven heats food by only exciting water molecules - the infrared radiation excites only protons in the fuel cell thus increasing their conductivity. This new concept is used to develop fuel-flexible fuel cells for automotive and portable high-power applications.

(344) CPFD Software, LLC
Ken Williams
ken@cpfd-software.com
www.cpfd-software.com
The Barracuda software, built on the CPFD (Computational Particle Fluid Dynamics) technology, is used for complex engineering simulations used in the design of chemical looping and coal or biomass gasification technologies, which are key to zero or near-zero carbon emissions energy from these fuels.

(205) Clean Technologies & Sustainable Industries (CTSI)
Patricia Glaza & Laura Benold
pglaza@ct-si.org, laura@ct-si.org
www.ct-si.org
The Clean Technology & Sustainable Industries Organization (CTSI), a 501c6 non-profit industry association, represents the organizations developing, commercializing, and implementing energy, water, and environmental technologies. Clean technologies offer much needed solutions to growing resource security and sustainability concerns and are critical to maintaining economic competitiveness. CTSI brings together global leaders for advocacy, community development, networking, and information sharing to help bring these needed technologies to market more rapidly.

(212) Delphi Automotive Systems, LLC
Greg Grant
greg.l.grant@delphi.com
delphi.com
This project will create a 600V Gallium-Nitride-on-Silicon (GaN-on-Si) device combined with sintered interconnects and double-sided cooling that will outperform existing IGBT devices by 3-5 times and enable a roadmap to reduce cost, size and energy losses by 50% for automotive applications within 5-7 years. The deliverable will be a GaN-on-Si based, electrically stable, packaged 600V depletion-mode HEMT power device with a second chip providing anti-parallel diode and normally-off behavior.

(245) Diamond-Roltran, LLC
Jeffrey Gilling
sales@diamond-roltran.com
www.diamond-roltran.com

(126) Diversified Technologies, Inc.
Michael Kempkes
kempkes@divtecs.com
www.divtecs.com
Pulsed Electric Field (PEF) technology is a low cost, low energy process that applies high voltage electric pulses to an algal (or other biomass) slurry. The pulses rupture cell walls, exposing intracellular materials for more efficient downstream separation and extraction. The process is in-line and scalable to high volume. Though treatment protocols for biofuel processing are yet to be developed, PEF is proven in food disinfection and wastewater processing where it is currently in commercial use.

(536) DOE EERE
Kevin J. Brosnahan
Kevin.Brosnahan@ee.doe.gov
www.energy.gov

(516) EaglePicher Technologies, Inc.
Dave Lucero
jodi@pnl.gov
www.eaglepicher.com
EaglePicher Technologies, Inc. is teaming with Pacific Northwest National Laboratory to develop the next-generation sodium-alumina batteries for the nation's large-scale energy storage needs. The outcome of this project will have direct impact on establishing U.S. leadership in stationary storage, and will demonstrate a competitive path to cost effective electrical energy storage. Analysis indicates this technology can lead to 26% lower life-cycle costs and reduction of 150 million tons per year in total GHG emissions.

(237) EcoMotors, International
Don Runkle
jennifer.wilson@ecomotors.com
www.ecomotors.com
EcoMotors, International's opposed-piston, opposed-cylinder (opoc®) engine is the best propulsion system, offering superior fuel efficiency in a compact size, at the lowest cost and with the lightest carbon footprint. This advanced internal combustion engine is half the size and weight of a conventional engine, with no compromise in power. The opoc® engine's unique architecture – specifically, the ability to achieve true modular displacement — delivers up to 60% greater fuel efficiency. With 50% fewer parts than a conventional engine, the opoc® is 20% less expensive to manufacture. (...)

(128) Eltron Research & Development
Damon Waters
business@eltronresearch.com
www.eltronresearch.com
Eltron's Cyclic CombustionTM process involves the direct contact of solid fuels with an oxidized carrier resulting in a highly efficient combustion reaction with CO2 capture. Cyclic CombustionTM offers a simpler and more economical approach to rapidly transition the power industry to carbon capture. Eltron is a full service research and development lab with a 30 year history of providing technology solutions in the fields of energy, chemical processing and advanced materials.

(134) Energy Focus, Inc.
Roger Buelow
rbuelow@efoi.com
efoi.com
Smart Lamps are socket compatible LED light bulbs including communication and optimization software. The lamps save energy over existing fluorescents when used alone, but when paired with environmental sensors, occupant use plan and human factors identification the savings can grow to over 75%. Smart Lamps build on breakthroughs in optics, thermal management, electronics and LED science developed for the US Armed Forces. Control and optimization algorithms are built on new low cost wireless communication systems.

(136) EnOcean
Troy Davis
troy.davis@enocean.com
www.enocean.com/en/
EnOcean has developed revolutionary HVAC and lighting solutions that accelerate the advancement of building energy management & hurdle barriers that have so far stifled widespread integration. Principal components are wireless sensors powered by Energy Harvesting technologies. EnOcean sensors perform where other technologies cannot - providing non-invasive installations and fast paybacks. Energy harvesting controls will be showcased at Booth 136 (for further details: troy.davis@enocean.com).

(243) Enveneeco, Inc.
Enveneeco
skalanidhi@enveneeco.com
enveneeco.com
We are implementing proven and time-tested technologies and processes that make products like NASA space shuttle fuel, Antibiotics, Plastics and Kevlar in the domain of Biomass energy. We are making process improvements or simplifications to bring down the cost of Biomass energy (synthetic coal) so that our renewable coal can compete with regular coal. Enveneeco's Pyrolysis Plant utilizes both organic (such as woody biomass) and in-organic (such as MSW) as energy inputs and converts them to Renewable Biomass Fuel (RBF). (...)

(221) Envia Systems
Michael Sinkula and Sujeet Kumar
nedwards@enviasystems.com
www.enviasystems.com
Envia Systems, in partnership with Argonne National Laboratory, proposes to develop high energy density lithium ion batteries using nano silicon-carbon composite anodes and high capacity layered-layered composite cathodes. Envia has developed the highest energy density cathode material known to date and when complemented with a silicon-carbon composite anode, a battery with over 400 Wh/kg and long cycle life can be produced. This project will enable energy storage systems with a cost reduction of over 3X, making widespread adoption of EVs & PHEVs possible.

(138) eSolar
Dr. Philip Gleckman
philip.gleckman@esolar.com
www.esolar.com
eSolar is developing a cost-effective solar air receiver integrated with gas turbines. Existing steam receivers have high O&M costs and water usage, while past demonstrations of hot air receivers have fallen short of expectations due to low efficiency and lack of durability. eSolar's Light Guide Receiver addresses these shortcomings by managing the distribution and transfer of intense solar energy. The outcome could achieve the lowest cost of any utility-scale solar plant.

(241) eVionyx and Reveo
Sadeg Faris
faris@reveo.com
www.evionyx.com www.reveo.com
Reveo, Inc. & Subsidiary eVionyx will present 3 transformational innovations which will contribute to achieving energy sovereignty for the United States much faster than the experts predict.
I. The Ziroxy Cycle
Our food originated from the hydrocarbon cycle (HCC) which is a continuously renewable redox reaction that enables the storage of solar energy in HC. The plants carry out the reduction of oxides through photosynthesis at ambient temperature. Human cells oxidize HC to generate energy to sustain life. For 10 years we have been investigating an analogous cycle for renewable storage (...)

(203) Flad Architects
Brad Ricker
bricker@flad.com
www.flad.com
Flad Architects designs environments that enhance human potential. As a strategic planning and design firm, we create facilities for specialized research that solves complex scientific challenges. Our extensive portfolio features a variety of innovative spaces for both public and private-sector clients, including multiple projects at DOE national labs and leading universities. With offices throughout the United States, and billions of dollars in completed science facility projects worldwide, our emphasis remains on our relationship with each individual client.

(316) FloDesign Wind Turbine Corp.
Stephen J. Fitzkee
sjfitzkee@fdwt.org
www.fdwt.org
FloDesign Wind's Mixer Ejector Wind Turbine (MEWT) is a new, shrouded, axial-flow wind turbine capable of delivering significantly more energy per unit swept area with greatly reduced rotor loading as compared to existing wind turbines. The MEWT is a direct descendant of modern jet engine technology where aerodynamic optimization is achieved through sound design, analysis and testing. The turbine is of a shrouded design with two high circulation ring airfoils encircling either an aggressively-designed traditional rotor or a high efficiency stator/rotor configuration. (...)

(140) FuelCell Energy, Inc.
Michael Lukas
mlukas@fce.com
www.fuelcellenergy.com
Biorefinery wastes are converted to valued assets in a new approach. Unlike conventional biodiesel production, no fossil fuels are needed to support transesterification of feedstock oil. Requisite methanol instead derives catalytically from glycerol, previously considered a waste. Other reactants in the glycerol conversion are derived from the biodiesel. This showcase presents the technology kernel and support for flexible production of fuel and power with inherent waste management.

(142) General Compression
Scott Davis
sdavis@generalcompression.com
www.generalcompression.com
General Compression allows wind energy to be fully dispatchable without burning fuel. Our 2MW compressor/expander absorbs and releases energy from conventional wind farms. When the wind blows too hard, energy is stored underground as compressed air, and is later expanded without burning gas to generate power. GC's technology uses a near-isothermal compression/expansion cycle, features a round trip efficiency over 70%, and has a response time of under 30 seconds.

(200) General Electric Company
Arthur Cotton
arthur.cotton@ge.com
www.ge.com
GE is imagination at work. From jet engines to power generation, financial services to water processing, and medical imaging to media content, GE people worldwide are dedicated to turning imaginative ideas into leading products and services that help solve some of the world's toughest problems.

(312) General Motors
Alan L. Browne
alan.l.browne@gm.com
www.gm.com
Our technology is a breakthrough high power density SMA solid-state thermal energy recovery system for harvesting waste heat with mass efficiencies in excess of those achievable with thermoelectrics. Another plus is that it only requires low grade heat sources for high power output, including even those in residences and those occurring naturally in the environment.

(303) General Motors Global R&D
Mei Cai and Anne Dailly
mei.cai@gm.com
MOFs are a class of crystalline microporous materials with pores and channels self-assembled by the bonding of metal ions with multifunctional organic ligands. Varying the metal, organic linker and reaction conditions has produced a diverse array of MOF structures. Given their potential for extraordinarily high surface areas, as well as their tunable pore sizes and surface functionalities, MOFs could revolutionize hydrogen storage and enable widespread commercialization of hydrogen fuel cell electric vehicles (FCEVs). These transformational vehicles offer the unique combination of zero pe (...)

(504) GeoTek Energy
Daryl Jensen
daryl.jensen@geotekenergy.com
www.goetekenergy.com
GeoTek Energy's Gravity Head Energy System (GHES) is a revolutionary and disruptive technology for the geothermal market. The GHES uses gravity and heat from a geothermal reservoir to generate energy and eliminate the large pumping loads in a binary geothermal power plant. The objective of the proposed R&D is to build a pilot plant for the GHES and confirm its merits. The approach GeoTek will take is to select a plant site, complete detailed design of key equipment, and construct the plant.

(305) Gibbs Energy
Joseph P. Maceda
jpmaceda@gibbsenergy.com
www.gibbsenergy.com
Round 1 Finalist: Electrochemical Pre-Combustion Carbon Capture: A low-temperature, liquid-phase process using waste heat to produce hydrogen from hydrocarbons, while capturing over 95% of the carbon. This carbon can then be sequestered or converted through a related process to high-value chemicals or fuels.
Round 2 Finalist: The Biocolumn: a Consortial Bioreactor for Making Liquid Fuels and High-Value Hydrocarbon Products.

(101) Global Energy Corporation
Brian R. Cohn
beecohn@gmail.com
www.globalenergycorporation.com
Global Energy Corp., Green Nuclear Energy from proprietary GeNiE technology - producing high-energy nuclear particles more efficiently than conventional approaches. GeNiE Reactors are designed to generate energy by fissioning or "burning" the world's hazardous "spent" fission fuel waste and weapons material stockpiles, or fueled by natural "un-enriched" uranium, and transmuting the materials into safer, less radioactive elements.

(240) GoNano Technologies, Inc.
Tim Kinkeade
tk@gonano-9.com
www.gonano-technologies.com
GoNano Technologies of Moscow, Idaho has developed a Carbon Capture & Recycle™ (CCR) catalyst technology that selectively converts ("recycles") CO2 into formic acid, formaldehyde, methanol and/or methane through a photocatalytic process, thus transforming CO2 from a liability to a valuable commodity. The CCR advantage is obtained through the combined use of a known photocatalyst with GoNano's proprietary Nanospring™ catalyst support. Visit booth 240 and www.gonano-9.com to learn more.

(307) Graphene Energy Inc
Dr. Dileep Agnihotri
dileep.a@grapheneenergy.net
www.grapheneenergy.net
Graphene Energy Inc., an Austin-based startup, is developing a new generation of ultracapacitors with graphene as the electrode material and ionic liquid as electrolyte that can operate at higher voltage. Today's energy density limitation of ultracapacitors (bulky) comes from the limited surface area of the activated carbon-based electrodes, as well as the limited electrochemical window (2.7 V) of the organic electrolytes. With our technology we foresee 3-5 fold improvement in energy density, while also maintaining the superiority in power and cycling lifetime over existing supercapacitors (...)

(300) Great Lakes Energy Institute at Case Western Reserve University
Lyndy Rutkowski
lyndy@case.edu
energy.case.edu
Great Lakes Energy Institute is an advanced energy research center at Case Western Reserve University. Led by researchers at the Case School of Engineering, this multidisciplinary center is integrated with all of the graduate and professional schools at Case Western Reserve University. As an Ohio Center of Excellence in Advanced Energy, GLEI partners with industry, government and other universities worldwide to catalyze research in renewable energy generation, storage and efficiency into sustainable, affordable energy solutions.

(113) Hyperion Power Generation Inc.
Deborah Deal Blackwell
deborah@hyperionpowergeneration.com
www.hyperionpowergeneration.com
A cartridge offering clean, green, reliable, robust, continuous 24/7 base load power for homeland security, emergency response, military installations, and remote locations is being developed by Hyperion. This small, transportable, permanently sealed "battery" will offer 70 MWt or 25 MWe – enough electricity for 20,000+ American homes or the industrial/military equivalent – and will run for 8-10 years without on-site refueling. More power can be generated by teaming several modules (HPMs) together.

(309) IBM
Dr. John Carter and Dr. Pradip Bose
IBM Innovation Agenda for Green Data Centers IBM's Green Data Centers research initiative focuses on innovative energy-saving breakthroughs in data center design and management technologies. The foundations of these innovations span silicon technologies, electronic circuits, microprocessor architectures, memory and storage technologies, and systems management. IBM will showcase aspects of this research initiative, including energy-efficient processor architectures, pervasive chip-to-facility-level measurement technologies, autonomous dynamic system power management mechanisms, memory power (...)

(215) ITN Energy Systems
Bruce Lanning
blanning@itnes.com
www.itnes.com
In support of the ARPA-E, building efficiency (net zero energy) initiative, the ITN team, will transition its small area, all solid state electrochromic device on plastic into pilot-scale production to validate low-cost roll-to-roll manufacturability as well as to qualify scaled prototypes in simulated operating conditions at a technical readiness level suitable for commercialization . Similar cost savings have already been validated by ITN in the thin-film photovoltaic industry relative to existing large format in-line processes.

(532) Joby Energy
Archan Padmanabhan
archan@jobyenergy.com
www.jobyenergy.com
Wind is an abundant, clean, and renewable energy source, but conventional wind turbines are limited by the intermittent availability of near-surface winds. Joby Energy's airborne wind turbines harness the stronger and more consistent winds in the higher altitude, which contain nearly twice the energy of near-surface winds.

(303) Kauffman Foundation
Lesa Mitchel
Lmitchel@kauffman.org

(518) Lawrence Berkeley National Laboratory
Lawrence Berkeley National Laboratory
pjpatterson@lbl.gov
www.lbl.gov/
Lawrence Berkeley National Laboratory (Berkeley Lab) is a U.S. Department of Energy national laboratory located on a 200 acre site high in the hills of Berkeley, California. Managed by the University of California, it conducts unclassified scientific research for DOE's Office of Science and is home to more than 3,100 employees with a projected budget for FY2010 of approximately $774 million. Berkeley Lab was founded in 1931 by Ernest Orlando Lawrence and its history includes 11 Nobel Prizes and 13 National Medal of Science winners.

(244) Lawrence Livermore National Laboratory
Roger Aines
aines@llnl.gov
www.llnl.gov
A significant opportunity to improve carbon dioxide capture systems exists through the development of robust new, small molecule catalysts mimicking behavior of the naturally occurring enzyme carbonic anhydrase, which converts CO2 to carbonic acid. Such synthetic catalysts can dramatically increase the rate of CO2 separation from gas mixtures (like flue gas), and hence reduce the size and cost of industrial processes that seek to keep CO2 from being emitted to the atmosphere. This separation cost is the primary barrier to worldwide carbon capture and storage necessary to mitigate climate change(...)

(313) Liquid Light
Emily Cole
info@LLfuels.com
www.LLfuels.com
Liquid Light is developing systems for electrochemical conversion of carbon dioxide (CO2) to fuels. Liquid Light and the process inventors at Princeton University have demonstrated efficient conversion of CO2 to methanol and propanol, and identified pathways for producing butanol and higher order fuels. Use of abundant materials will allow us to scale our processes with large-volume techniques from the chemical industry and potentially address the demand for all U.S. transportation fuels.

(319) Lockheed Martin Aeronautics
Todd McBee
todd.mcbee@lmco.com
Pyroelectric energy harvesting enables conversion of turbulent, low-speed wind energy into electricity. Surface panels incorporating pyroelectric membranes provide an aesthetically-pleasing wind power solution for existing buildings.

(321) Lockheed Martin MS2
Frank Rotondo
frank.s.rotondo@lmco.com
www.lockheedmartin.com
Rectifying antennas convert electromagnetic fields into alternating currents on conductors, then immediately rectify these to direct currents for use by external loads. Efficiencies well in excess of traditional PVs are theoretically possible. Our design is based on low-cost, scalable, bottom-up self-assembly processes. We plan to develop optical and infrared rectennas that will address key applications in solar energy and waste heat conversion.

(325) Makani Power
Corwin Hardham
corwin@makanipower.com
www.makanipower.com
The Makani Airborne Wind Turbine (AWT) converts wind energy to grid quality, utility scale electricity using tethered, high-performance wings outfitted with turbines. Like the tip of a conventional wind turbine blade, the wing flies across the sky at many times the speed of the wind. Power is extracted from this motion by the wing-mounted turbines and transmitted to the ground through an electrically-conducting tether. However, because the wing is not constrained to rotate about a hub, it can sweep a much larger section of the sky than a conventional wind turbine and at a higher altitude (...)

(333) Massachusetts Institute of Technology (MIT)
Robert E. Doe
redoe@mit.edu
ceder.mit.edu
The Materials Genome at MIT consists of high-throughput computational investigation, which drives our experimental team towards rapid discovery of new energy storage materials. By combining high-throughput ab-initio methods with data-mining algorithms our team of theorists quickly explores a vast chemical space in an exhaustive manner, allowing us to direct our experimental efforts towards the synthesis and characterization of the most promising next generation energy storage materials.

(327) May Ruben Technologies
Peter Ruben
pruben@albertamining.com
www.may-rubentechnologies.com
BINARY FLUID COMPRESSOR There is an enormous need for an efficient, low cost, thermally-driven refrigeration system utilizing environmentally benign refrigerants. Binary Fluid Compressor (BFC) technology fills this gap. BFC's are novel, ejector-type fluidic compressors that replace the electro-mechanical compressors used in conventional refrigeration-based thermal cycles. BFC characteristics & benefits: super-efficient thermally-driven heat pump, equaling or exceeding the efficiency of current mechanical compressors, utilize renewable power sources such as solar thermal and geothermal. (...)

(214) MC10 Inc.
Jeffrey Carbeck
jcarbeck@mc10inc.com
mc10inc.com
MC10 integrates high performance inorganic electronics with elastomeric substrates and stretchable interconnects.

(228) MDB Capital Group
Christopher Marlett
m@mdb.com
www.mdb.com
MDB Capital Group is a merchant and investment banking firm focused exclusively on financing innovative companies rich in intellectual property. Founded in 1997, MDB successfully founded and funded 5 public companies that grew from ideas to over $3 billion in combined market value. PatentVest, MDB's IP intelligence platform, tracks over 4,000 public and private companies on the basis of intellectual property strength, value and impact. As a merchant bank deploying its own capital, MDB provides an alternative to traditional VC financing for early to late-stage private companies.

(145) Mechanical Solutions, Inc.
Tom Walter
tjw@mechsol.com
www.mechsol.com
As recognized experts in rotating machinery, MSI will showcase a concept for an oil-free, high-efficiency steam turbine generator. The machine can generate 1 MW from energy typically wasted in installations that use pressure reducing valves for heating or other steam processes. The device has a small footprint and is being designed for back-fit into existing steam plants and boiler rooms. Also highlighted: Our work in wind turbine health assessment using non-intrusive ground mounted sensors.

(329) Michigan State University
Norbert Mueller
mueller@egr.msu.edu
The Wave Disk Generator revolutionizes auto efficiency at lower vehicle costs. Currently, 15% of automobile fuel is used for propulsion; the other 85% is wasted. A Wave Disk Generator hybrid uses 60% of fuel for vehicle propulsion.
MSU's shock wave combustion generator is the size of a cooking pot and generates electricity very efficiently. This revolutionary generator replaces today's 1,000 pounds of engine, transmission, cooling system, emissions, and fluids, resulting in a lighter, more fuel-efficient electric vehicle. (...)

(105) MIT, GroupSadoway
Luis Ortiz, Dane Boysen, and David Bradwell
wolff@mit.edu
web.mit.edu/dsadoway/www/
Grid-scale energy storage is a crucial technology to enable the use of renewables as a means of reliably meeting the nation's electricity needs (MWh stored at MW-rates). Inspired by the Hall-Héroult cell used in the production of aluminum, the PI invented a new concept in electrochemical energy storage: reversible ambipolar electrolysis - electrolytic production of metal at the cathode and the anode. This established the scientific basis for a liquid metal battery consisting of three layers.

(335) Momentive Performance Materials
Keith Weller
Keith.weller@momentive.com
www.momentive.com
Momentive Performance Materials proposes to develop a new polymeric mirror film that features high reflectivity, lower cost, lighter weight, and longer reflectivity durability (estimated 20-30 years) as compared to existing mirror film systems. The mirror film is expected to use a new multi-layer coating system incorporating world-class silicone hardcoat technology developed by Momentive Performance Materials, and be produced in a low-cost manner in a roll-to-roll process.

(236) MTPV, LLC
David Mather
dmather@mtpvcorp.com
www.mtpv.com
Introducing a new technology that converts heat to electricity with breakthrough performance using semiconductor chips. Our modular semiconductor chips can generate electricity using 45% less heat and 10X-50X more power than traditional systems. Our advantage in solid state design, scalability, and power density has the potential to create revolutionary new products to convert waste heat to electricity, enhance concentrated solar, and create a new breed of portable power solutions.

(143) N. A. Tech. Inc.
Jerry Jones
www.natech-inc.com and www.energyntech.com
Reduce on-land wind energy cost to well below 3 cents per kW-hr. Reduce transmission costs by concentrating large (up to 10 MW turbines into one location. Eliminate transportation and crane costs for towers. Generate 8X the amount of energy, in the Great Plains, of the U.S. annual consumption. With new direct conversion of CO2 and H2 to liquid transportation fuels, make the U.S. a major exporter of liquid fuels and eliminate the U.S. dependence on foreign liquid fuels.

(520) NanoTune Technologies Corp.
Dr. Vinod Nair
vinodnair@nanotune.com
www.nanotune.com
NanoTune Technologies Corp. aims to leap the overall performance of supercapacitors 50 times within the next five years. The company has already achieved high capacitance by controlling the pore size distribution of electrodes. The company's unique abilities: (1) to precisely control the pore size, shape, and surface area of a monolithic nanoporous carbon electrode by the perfect combination of nanotuning® and nanocasting® (2) precise doping/copolymerization with metal ions precursors to increase psudocapacitance and (3) reduce charge separation to enhance the capacitance.

(526) National Energy Technology Laboratory
Cynthia Powell
David.Anna@netl.doe.gov
www.netl.doe.gov
The National Energy Technology Laboratory (NETL), part of DOE's national laboratory system, is owned and operated by the U.S. Department of Energy. NETL implements a broad spectrum of energy and environmental research and development programs enabling domestic coal, natural gas, and oil to economically power our Nation. NETL will be demonstrating several technologies under development in their Office of Research and Development including: Carbon Capture Technologies - sorbents, oxyfuel combustion; Carbon Sequestration Program -risk analysis; (...)

(508) National Renewable Energy Laboratory
David Glickson
david.glockson@nrel.gov
www.nrel.gov
The National Renewable Energy Laboratory (NREL) is the nation's primary laboratory for renewable energy and energy efficiency research and development. NREL's mission and strategy are focused on advancing the U.S. Department of Energy's and our nation's energy goals. The laboratory's scientists and researchers support critical market objectives to accelerate research from scientific innovations to market-viable alternative energy solutions.

(103) Nevada Institute for Renewable Energy Commercialization
Li Han Chan
lihan.chan@nirec.org
www.nirec.org
NIREC is a 501(c)3 nonprofit public-private partnership that integrates researchers, experienced entrepreneurs, business executives, and financial capital to identify, fund and accelerate the development of renewable energy technologies. With a focus on renewable energy, energy conservation and energy efficiency, NIREC launches early stage companies focused on the commercialization and widespread deployment of renewable energy solutions. In summary, NIREC provides funding and commercialization support services to clean energy innovators and researchers to transform their ideas. (...)

(341) North Dakota State University
Douglas Schulz
doug.schulz@ndsu.edu
Silicon nanofibers as the anode in a lithium ion battery offer a >10-fold increase in energy density compared to graphite. The technology under development at NDSU addresses the need to manufacture practical nanofiber quantities of targeted chemical composition.

(119) Oak Ridge National Laboratory
Nagraj Kulkarni
kulkarnins@ornl.gov
This project aims to develop copper reactive ion etching (Cu-RIE) technology for manufacturing nanoscale copper interconnects used in IC chips in order to achieve a 50% reduction in the electrical resistivity of sub-50 nm wide copper nanowires and a potential energy savings of over $32 billion/year. This new approach is demanded by the exponentially increasing resistivity with shrinking feature sizes of copper interconnects manufactured with current damascene technology.

(141) OPX Biotechnologies, Inc.
Dr. Michael Lynch
mrosenberg@opxbio.com
www.opxbio.com
OPX Biotechnologies, Inc. (OPXBIO), the National Renewable Energy Laboratory and Johnson Matthey will develop & optimize a novel engineered microorganism that directly produces a biodiesel-equivalent electrofuel from H2 and CO2. The proposed process will generate infrastructure-compatible, energy-dense fuel that produces no byproducts and has an estimated production cost less than $2.50/gallon. Through commercialization, our approach will create a significant number of jobs in the U.S.

(137) Oscilla Power, Inc.
Rahul Shendure and Balky Nair
shendure@oscillapower.com
www.oscillapower.com
Oscilla Power is developing breakthrough renewable energy devices based on low cost, readily available magnetic materials. Our wind generator uses a hybrid transmission, ferrite magnets, and a novel mechanical design to deliver efficiency, reliability and supply security at a substantially lower cost and weight than today's generators. Our wave energy harvester uses magnetostrictive alloys and a no-moving-parts design to deliver baseload power that is cost competitive with coal or natural gas.

(528) Pacific Northwest National Laboratory
Jodi Melland
jodi@pnl.gov
www.pnl.gov
Pacific Northwest National Laboratory (PNNL) is one of the U.S. Department of Energy's ten national laboratories, managed by the Office of Science. Our researchers are advancing the frontiers of science and delivering solutions to our nation's biggest challenges in energy, environment, and national security.

(127) Palo Alto Research Center, Inc.
Sean Garner
Sean.Garner@parc.com
www.parc.com
Cooling applications represent one quarter of the electricity use in the United States, and efficiency improvements in cooling systems could lead to dramatic energy savings and greatly reduced carbon dioxide emissions. Thermoacoustic pulse-tube refrigeration technology can provide exceptional performance at cryogenic temperatures, but due to limitations of current techniques it cannot be effectively applied at room temperature. We have developed a thermoacoustic cooler design which overcomes this deficiency, and promises to achieve twice the efficiency of the best current air conditioning systems.

(125) Palo Alto Research Center, Inc.
Dr. Ashish V. Pattekar
pattekar@parc.com
www.parc.com
We present a novel integrated hydrocarbon fuel processor + fuel cell power generator for portable, stationary and auxiliary power (APU) applications. Our radial flow micro-reactor design provides an improvement of 18X to 20X in fuel to hydrogen processing performance, enabling fuel cell based integrated power sources that can actually meet or exceed the current DOE targets of 1000 WH/liter. This could truly transform existing applications and open new opportunities in a wide range of markets.

(144) Paper Battery Company
Shreefal Mehta
shreefal@paperbatteryco.com
www.paperbatteryco.com
The company is commercializing a flexible, scalable nanocomposite sheet material (PowerWrapper™) for energy storage, leveraging established technology of supercapacitors and economies of roll-to-roll printing processes. Distributed generation with renewables needs massive storage to achieve high integration. Structurally integrated into everyday objects ranging from portable electronics to buildings for grid level applications, PowerWrapper will provide massively scalable storage with no increase in footprint in existing urban and suburban structures.

(129) Penn State
Paul Painter
painter@matse.psu.edu
This program involves the application of ionic liquids (ILs) to the processing of fossil fuels. We have found that certain ILs disperse, swell and solubilize coals to a remarkable degree at low temperatures. They also appear to act as catalysts in subsequent liquefaction reactions, which occur at relatively low temperatures in these solvents (250C-300C). In addition, it has also been determined that ionic liquids can be used to separate bitumen from both Canadian oil sands and tar sands obtained from Utah. (...)

(131) Penn State
John Badding
jbadding@chem.psu.edu
www.ee.psu.edu/faculty/tmayer/tmayer1.html
We aim to develop inexpensive, flexible hydrogenated amorphous silicon (a-Si:H) pillar array photovoltaic (PV) cells with high, stable one-sun conversion efficiencies. The dramatic improvements in cost and efficiency will be achieved by using a new chemical fluid-deposition (CFD) technique to grow coaxial a-Si:H p+-i-n+ junctions in dense arrays of high-aspect-ratio pores patterned in polyimide polymer sheets. In contrast to plasma processes, CFD allows ultra-conformal sequential deposition of a-Si:H, metals, and transparent conducting oxides in a simple, low-cost reaction chamber. (...)

(115) Phononic Devices
Anthony Atti, Ph.D.
atti@phononicdevices.com
www.phononicdevices.com
Phononic Devices is commercializing advanced thermoelectric semiconductor materials designed to convert waste heat from industrial and commercial processes into usable electric power, and conversely, highly efficient cooling and refrigeration. Phononic Devices' unique approach and design concepts are projected to dramatically improve thermal to electric energy conversion efficiency making possible a more than $125B market opportunity.

(343) Pilus Energy
Jason E. Barkeloo
jbarkeloo@pilusenergy.com
PilusEnergy.com
The development and optimization of one of the most sought after emerging "green" technologies are those involving microbial fuel cells (MFCs). MFCs produce energy in the form of direct current electricity and/or hydrogen gas, valuable organic byproducts, and/or reduce "carbon credit"-like issues. The metabolic "engines" of MFCs are typically bacteria, but can also be algae or fungi. However, the genetic manipulation of such bacteria for the purpose of increasing overall energy production is a subject of recent interest as the genomes of many bacteria are now known. (...)

(336) Planar Energy
Scott Faris
faris@planarenergy.com
www.planarenergy.com
Planar Energy is a development stage company focused on large format solid state batteries. Planar's batteries are all inorganic materials and include a new generation of solid state ionically conductive separator materials with conductivity equal to liquid electrolytes. Planar's materials and device architecture innovations promise to deliver a 200%+ increase in energy density. Planar's battery technology is based upon a process and materials innovation, SPEED, which is new inorganic thin film manufacturing process that is dramatically more flexible and scalable than existing methods. (...)

(133) Plasma Kinetics Corporation
Paul Smith
www.plasmakinetics.com
Fuel-cell hydrogen is safely stored and retrieved, without the need for pressurization or heat. Optically enhanced CD-like disks are prepared with high surface areas and beam channels. Inexpensive, light-weight laser systems release 5wt% fuel-cell hydrogen while consuming under 3% of stored energy, and achieving higher efficiencies than batteries.

(522) Porifera, Inc.
Olgica Bakajin and Aleksandr Noy
info@poriferanano.com
www.poriferanano.com
Porifera is developing high flux/selectivity carbon nanotube (CNT) membranes for uses ranging from water purification to efficient separation of CO2 from the industrial emission streams. Membrane-based CO2 separations could potentially deliver better efficiency, cheaper sequestration, and low energy consumption. Unique structure of sub-2-nm carbon nanotube-based membranes pores results in gas permeation fluxes that are two orders of magnitude higher than any other membrane of comparable pore size. Porifera seeks to develop a set of breakthrough technologies that will capitalize on these (...)

(232) Potter Drilling Inc.
Jared Potter
mark@potterdrilling.com
www.potterdrilling.com
Potter Drilling is developing technology for cost-effective drilling in crystalline hard-rock environments such as granite. Our technology is based on a mechanism called "spallation" that removes rock without making contact. The result is significant cost savings and performance advantages over conventional drilling methods in hard-rock environments. Potter Drilling is commercializing geothermal Well Enhancement Systems which will improve the economics and expand the base of geothermal power production.

(345) QM Power, Inc.
PJ Piper
pjpiper@qmpower.com
www.qmpower.com
QM Power, Inc. is commercializing proprietary, patented and enabling advances in a lower cost, higher performance electric motor, generator and actuator technology called Parallel Path Magnetic Technology (PPMT™). PPMT™ is a breakthrough technology that uses permanent magnets in a novel yet simple and efficient magnetic circuit design that can substantially reduce size, weight and cost while significantly improving efficiency for almost any electro-mechanical application.

(122) RTI International
David C. Dayton
ddayton@rti.org
www.rti.org
The goal of this early stage R&D project is to develop a novel single-step catalytic biomass pyrolysis process with high carbon conversion efficiency to produce stable bio-crude with low oxygen content (<10%). Integrating this transformational technology in the existing domestic petroleum refining infrastructure can be an economically attractive option for second generation biofuels production. To successfully meet this challenge, RTI has assembled a diverse team that includes Archer Daniels Midland Company (ADM), ConocoPhillips (COP), and Albemarle Catalysts. (...)

(530) SAGE Electrochromics
Jim Wilson
jwilson@sage-ec.com
www.sage-ec.com
SAGE proposes to develop a suite of new manufacturing technologies that will enable volume production of energy-saving, comfort enhancing, electronically tintable windows. Novel processing steps will be integrated and demonstrated in large-area electrochromic window prototypes with features that meet market expectations. The goal is to overcome the bottlenecks that have prevented cost-effective production of electrochromic glass in the sizes and volumes that the building industry demands.

(524) Seeo, Inc.
Ilan Gur
igur@seeo.com
www.seeo.com
Seeo is developing a new generation of rechargeable lithium batteries with unprecedented energy density, lifetime, and safety. Leapfrogging existing performance and cost standards, Seeo technology represents a transformative solution to the critical national and global need for electric vehicles and large-scale grid-connected energy storage.

(301) Silicon Valley Bank
Mary Dent
MDent@svb.com

(304) Sky WindPower
Len Shepard
shepard@skywindpower.com
www.skywindpower.com
There is more than enough energy in high altitude winds to power the whole world. We plan to bring this power down to earth using flying electric generators. We will be able to produce utility scale clean power at $.03-.06/kWh while operating at altitudes up to 30,000 feet in special use airspace. Because high altitude winds exist in latitudes between 30 and 60 degrees north and south of the equator all over the world, the potential for power production with this technology is enormous.

(500) Solution Recovery Services (SRS Energy)
Tom Czartoski
tczartoski@teamusi.com
www.solutionrecovery.com
SRS has developed a transformational, patent-pending technology platform to efficiently fractionate the key biochemical compounds produced by microalgae. The SRS fractionation platform is based on an innovative mechanical chemical and thermal treatment protocols that serve to digest and isolate the key algae compounds and uniquely conditions the lipid, protein and carbohydrate fractions in a distinctive way readily convertible to additional fuels or valuable products. The technology offers a low energy and high product yield platform that can be applied at large scale. (...)

(502) Sorian, Inc.
Chad Barden
cbarden@sorian-inc.com
www.sorian-inc.com
At booth 502 just outside the main exhibition hall, Sorian will be demonstrating two after-market accessories for utility-scale wind turbines: (1) A 3-D sensor array enabling a 30% reduction in blade and gearbox stress (2) A non-mechanical system for controlling airflow and lift, affording a 20%+ net increase in annual power output

(230) Superconductor Technologies Inc.
Bob Hammond and Adam Shelton
bhammond@suptech.com
www.suptech.com
Superconductor Technologies Inc. (NASDAQ: SCON)is a world leader in the development and production of high temperature superconducting (HTS) materials and associated technologies. STI is working to convincingly demonstrate novel, alternative manufacturing technology that will dramatically lower the cost of HTS wire. STI proposes to extend its expertise as the world leader in high-throughput, low-cost manufacturing of high-quality HTS films for RF applications to production of 2G HTS wire.

(201) The Dow Chemical Company
Elizabeth Singleton
ESingleton@dow.com
www.dow.com
Showcase projects from The Dow Chemical Company illustrate how the company is accelerating the development of energy alternatives by investing in materials, technologies and business strategies that enable breakthrough solutions. Examples include DOW™ POWERHOUSE™ Solar Shingles, revolutionary low-cost, thin-film CIGS photovoltaic cells in the form of solar shingles that can be integrated into rooftops, as well as advanced energy storage technologies from Dow Kokum in the form of lithium ion battery packs for hybrid and electric vehicles.

(117) The Ohio State University
Liang-Shih Fan, Fanxing Li, Deepak Sridhar, and Andrew Tong
leefxing@gmail.com
www.chbmeng.ohio-state.edu/~fan/research/
The Syngas Chemical Looping (SCL) and Coal Direct Chemical Looping (CDCL) processes developed at the Ohio State University (OSU) can efficiently convert coal and biomass into electricity, hydrogen, and/or liquid fuel with zero or negative net CO2 emission. Independent process analyses indicate that the processes are transformational, carbon negative technologies with significantly higher efficiency than the state-of-the-art processes. SCL has been successfully demonstrated at bench and sub-pilot scales. CDCL has been tested at bench scale with promising results. (...)

(318) The Pennsylvania State University
Craig A. Grimes
cgrimes@engr.psu.edu
Towards Scale Solar Conversion of CO2 and Water Vapor to Hydrocarbon Fuels. Abstract: We have achieved efficient solar conversion of CO2 and water vapor to methane and other hydrocarbons using high surface area nitrogen doped titania nanotube arrays, sensitized with nano-dimensional islands of co-catalysts copper and Ni, Pd or Pt (1). Intermediate reaction products, H2 and CO (e.g. syngas), are also detected, with relative concentrations dependent upon the nature of the co-catalysts. (...)

(226) ThermoDynamic Films LLC
Richard Epstein
richard.epstein@gmail.com
ThermoDynamic Films LLC is developing Energy Wrap, a thin-film technology that extracts electrical power from waste heat. Using cost effective and efficient Energy Wrap in automobile radiators will satisfy all the vehicles' electrical needs. In power plants, Energy Wrap can harvest electricity from the hot effluent to increase the plant's overall efficiency. Running Energy Wrap in reverse creates an economical, flexible, thin-film format for refrigeration and air conditioning.

(224) TIAX
Dr. Rob Fricke
fricke.robert@tiaxllc.com
www.tiaxllc.com
TIAX develops advanced Li-ion battery systems and component materials, as well as innovative, retrofitable building technologies for increased energy efficiency. TIAX's proprietary CAM-7 nickel-class high-energy cathode material and our nano-composite anode provide pathways to major increases in energy density over existing Li-ion batteries. TIAX is also developing advanced building technologies including smart building sensor control systems, insulation thermal interface materials, and retrofitable high-efficiency HVAC components.

(225) Transonic Combustion
Mike Rocke
mike.rocke@tscombustion.com
tscombustion.com
Transonic Combustion is commercializing the first factory fuel delivery system that generates supercritical fuel enabling high mpg, low emission vehicles. Supercritical fuel injection achieves better control of combustion location and timing, resulting in significantly less fuel consumption and cleaner combustion. Transonic is collaborating with automotive manufacturers for future high-volume supply of our "relative drop-in" systems, designed to run on gasoline and advanced bio-renewable fuels.

(121) United Technologies
Harry Cordatos
cordath@utrc.utc.com
www.utc.com
Carbonic anhydrase, one of the fastest enzymes known, is used by all air-breathing organisms for CO2 management. A key aspect of its catalytic mechanism can be exploited by incorporating a synthetic analogue of the enzyme in a membrane to facilitate separation of CO2 from power plant flue gases.

(227) University of Arizona
James Roger
angelj@email.arizona.edu
rehnu.com
This is a new approach to low-cost gigawatt solar farms ($1/watt installed), using triple junction photovoltaic cells with 40% conversion efficiency. These cells cost $0.16/watt when used at 1000x concentration. Sunlight will be focused by 3-m square silvered dish reflectors, made at high speed and low cost by a modification of the float glass process now being developed. We have built an ultralightweight, 2-axis steel tracker to carry 8 reflectors and cooled receivers to produce 20 kW.

(229) University of California, Irvine
Matt Law
lawm@uci.edu
The mission of this project is to construct a tandem dye-sensitized water splitting cell that is at least 12% efficient in producing electricity and 8% efficient in producing hydrogen, stable in operation, and inexpensive to deploy. The tandem cell will set new performance records for solar energy conversion from nanostructured devices and, more importantly, provide a clear pathway to 15-20% efficient solar electricity and fuels production with an inexpensive, scalable technology.

(229) University of California, Irvine
Matt Law
lawm@uci.edu
To enable the rapid expansion of PV to the multi-TW scale, it is essential to develop alternative thin-film PV materials based on common (rock-forming) elements and inexpensive manufacturing processes. We are pursuing two low-cost approaches for making high-quality layers of an earth-abundant semiconductor for efficient PV modules: solution-phase colloidal "solar paint" and gas-phase CVD growth. Our device design is based on a commercially proven thin film device structure that can be readily scaled up using existing production lines and manufacturing know-how.

(217) University of California, Riverside
Yushan Yan
Yushan.Yan@ucr.edu
www.cee.ucr.edu/yushan
Proton exchange membrane fuel cells have demonstrated high power density and energy density but are still too high to be competitive with conventional technologies primarily because of their reliance on platinum as the catalysts. We propose to develop a new class of hydroxide exchange membranes that can eliminate the use of platinum and replace it with inexpensive metals such as nickel and silver, thus providing the breakthrough needed to make fuel cell technology commercially viable.

(514) University of Delaware
George Hadjipanayis and Peter Dent
hadji@udel.edu
The goal of this project is to develop materials with properties better than Nd2Fe14B (the world's strongest magnet) that will allow us to fabricate the next generation of permanent magnets with magnetic energy density (maximum energy product) much higher than the current value of the strongest Nd-Fe-B magnets (59 MGOe) approaching the theoretically predicted value of 100 MGOe. The following three different routes will be employed for the development of these materials. The first route will be aimed at discovering new materials with high anisotropy and high saturation magnetization. (...)

(332) University of Maryland
Eric Wachsman
ewach@umd.edu
www.energy.umd.edu
We propose to revolutionize transportation, stationary, and personal power technologies through the development of a low temperature solid oxide fuel cell (SOFC). Our SOFC technology utilizes high performance materials unique from anything currently funded by DOE. We have demonstrated extremely high power densities of ~2 W/cm2 at moderate temperatures (650°C) and sufficient power down to 400°C, thus attaining the temperature "sweet spot" necessary to transform fuel cell technology. Moreover, we have demonstrated the ability to operate these SOFCs on conventional fuels. (...)

(330) University of Maryland Energy Research Center
Eric Wachsman
ewach@umd.edu
www.energy.umd.edu
We have developed novel membrane reactor technology, based on high temperature proton conductors, that can convert a wide range of hydrocarbons to pure H2, and syngas for subsequent Fisher Tropsch synthesis of liquid fuels and chemical feed stocks. By simultaneous H2 permeation and catalysis, we have demonstrated the ability to increase water gas shift yields >70% over thermodynamic limitations. Similarly we have demonstrated increases in steam reforming yields, and the ability to reform CH4 with CO2. The later creates the opportunity for a revolutionary method for carbon sequestration.

(233) University of Maryland Energy Research Center
Victor Yakovenko
yakovenk@umd.edu
www2.physics.umd.edu/~yakovenk/
We present a radically new design for photovoltaic energy conversion using surface acoustic waves (SAWs) in piezoelectric semiconductors. The periodically modulated electric field of SAW separates photogenerated electrons and holes and transports them with the speed of sound (3 km/s) to collecting electrodes. Recent experiments (2009) using SAWs have demonstrated quantum efficiency of 85%. This active design promises in a very high rate of photovoltaic energy conversion for solar applications.

(510) University of Massachusetts Amherst
Susan Leschine
suel@microbio.umass.edu
umass.edu
Using genomics, bioinformatics, and metabolic modeling, we are discovering and improving new plant-microbe genomic systems that will provide next generation technologies for biofuels and bioproducts. These sustainable processes are based on a Consolidated BioProcessing (CBP) strategy for biomass conversion, in which enzyme production, hydrolysis, and fermentation are consolidated into a single process step with the potential to reduce production costs more than any other prospective improvement.

(326) University of Minnesota
Martin Saar
saar@umn.edu
www.geo.umn.edu/orgs/geofluids/
A research team at the University of Minnesota is developing a method to combine geologic CO2 sequestration with geothermal energy use. CO2 is injected into deep, naturally porous and permeable geologic formations. The geothermally heated CO2 is piped to the surface, used to produce electricity, and then returned to the subsurface. This new approach represents a radical shift in electric/heat power generation as it not only utilizes a renewable energy source but has a negative carbon footprint.

(328) University of Minnesota
Jane Davidson
david020@umn.edu
The broad goal of this project is to advance technology for efficiently reversing combustion by recycling CO2 and H2O back into high energy density hydrocarbon fuels using only solar energy to drive the highly endothermic reactions. This technology addresses the dual challenges of energy (transportation) security and reducing the risk of atmospheric-driven climate change.

(213) University of Minnesota/BioCee
Lawrence Wackett and Marc von Keitz
wacke003@umn.edu
www.biohydrocarbon.umn.edu
The research uses Shewanella bacteria for high-volume, hydrocarbon fuel-feedstock production. We are collaborating with researchers at the DOE's Pacific Northwest National Laboratory to develop a Shewanella-cyanobacteria co-culture for producing hydrocarbons from sunlight and carbon dioxide. Both carbon-dioxide and biomass-derived carbon will be transformed continuously to hydrocarbons within a novel thin-film latex coating technology developed by BioCee, Inc.

(324) University of Toledo
Marco Nardone
mnardone1@gmail.com
www.utoledo.edu/as/physast/
The invention of the semiconductor junction led to the explosive growth of the solid-state electronics industry, facilitated the information age, and made possible the transformation of sunlight into viable electricity. Yet, the formation of effective junctions is a sensitive and expensive undertaking that can only be accomplished with limited materials. We propose to advance a concept that removes the burden of the junction, thereby enabling the development of photovoltaic (PV) devices that have thus far been unimaginable. (...)

(139) Velkess Inc.
Bill Gray
bill@velkess.com
www.velkess.com
Velkess has made bench scale demonstrations (TRL4) of a novel high performance flywheel energy storage technology with far lower cost fundamental economics than any currently available grid scale energy storage systems. Using Velkess's simple and elegant Passively Self-Stabilizing Flexible Flywheel rotor system and Floating Rotor Electrostatic Motor Generator, Velkess can rapidly enter high volume production of low cost, large capacity, high efficiency energy storage systems.

(512) Velocys
Jeff McDaniel
mcdaniel@velocys.com
www.velocys.com
Velocys' microchannel process technology improves steam methane reforming, Fischer-Tropsch synthesis and hydroprocessing, which are key processes to convert biomass into high-quality, infrastructure compatible (drop-in) transportation fuels. The technology will greatly increase the productivity of chemical reactor hardware. Microchannel technology is characterized by parallel arrays of microchannels which accelerate processes 10 to 1,000 fold by reducing heat and mass transfer distances.

(238) Viryd Technologies
John Todd Langson
jlangdon@viryd.com
www.viryd.com
For wind turbines, or any electric motor application, the NuVinci® CVP continuously variable planetary gearset can combine a speed increaser/reducer, variable transmission, and motor/generator is a single device, called the "e-CVP" that is small, light, low cost, and can be manufactured using simple and well understood processes. The eCVP can maintain optimal rotor tip speed ratio while using inexpensive induction generators that do not require permanent magnets or rare earth materials.

(506) Wildcat Discovery Technologies, Inc.
Ross Russo
rrusso@wildcatdiscovery.com
www.wildcatdiscovery.com
Wildcat developed high throughput workflows to accelerate breakthrough material discoveries for energy storage applications. Wildcat's unique high throughput workflows allow >1000 materials per week to be synthesized, formulated into electrodes, and tested in actual cells. Wildcat focuses on the discovery of materials for next generation batteries, including lithium-ion, metal-air, and other novel chemistries. Wildcat also has high throughput capabilities targeting materials for CO2 capture, H2 storage, printable inks for solar, and other clean energy applications.

(202) Wilson Sonsini Goodrich & Rosati
John Mizroch
jmizroch@wsgr.com
www.wsgr.com
Wilson Sonsini Goodrich & Rosati is a leading law firm advising enterprises devoted to the development of energy and clean technologies and projects, and the institutions that invest in and finance them. We represent a dynamic client base that includes more than 300 emerging companies seeking to be tomorrow's energy leaders, mature energy technology and project development companies, leading investment banks, project finance lenders, private equity funds, and venture capital funds active in renewable energy and clean technology financings.

(311) Worcester Polytechnic Institute
James D. Van de Ven
vandeven@wpi.edu
www2.me.wpi.edu/MEPS
Hydraulic systems offer numerous advantages over competing technologies such as high power density and reliability; however, the energy storage density of hydraulic accumulators is significantly lower than energy storage devices in other energy domains. As a novel solution to improve the energy density of hydraulic systems, a flywheel-accumulator is presented, which integrates rotating kinetic and pneumatic energy storage. The flywheel accumulator is a cylindrical pressure vessel with a compressed gas volume and a hydraulic fluid volume, separated by a movable piston. (...)

(239) Xtreme Energetics Inc.
Colin P. Williams
cpw@XEsolar.com
www.XEsolar.com
Xtreme Energetics Inc. is developing a solar panel based on concentration, digital light-steering, and rectification. The rectification uses arrays of nano-scale vacuum tubes on a microchip, called a SUPERcell, which is not limited by material band-gaps, is not subject to severe performance degradation by higher temperatures, is not overly sensitive to ionizing radiation, and does not use rare elements. We are working towards cell with >64% efficiency for utility-scale power generation.

Notes

Participants by Technology

ENERGY INNOVATION SUMMIT

Technology Showcase Participants

ARPA-E Awardees

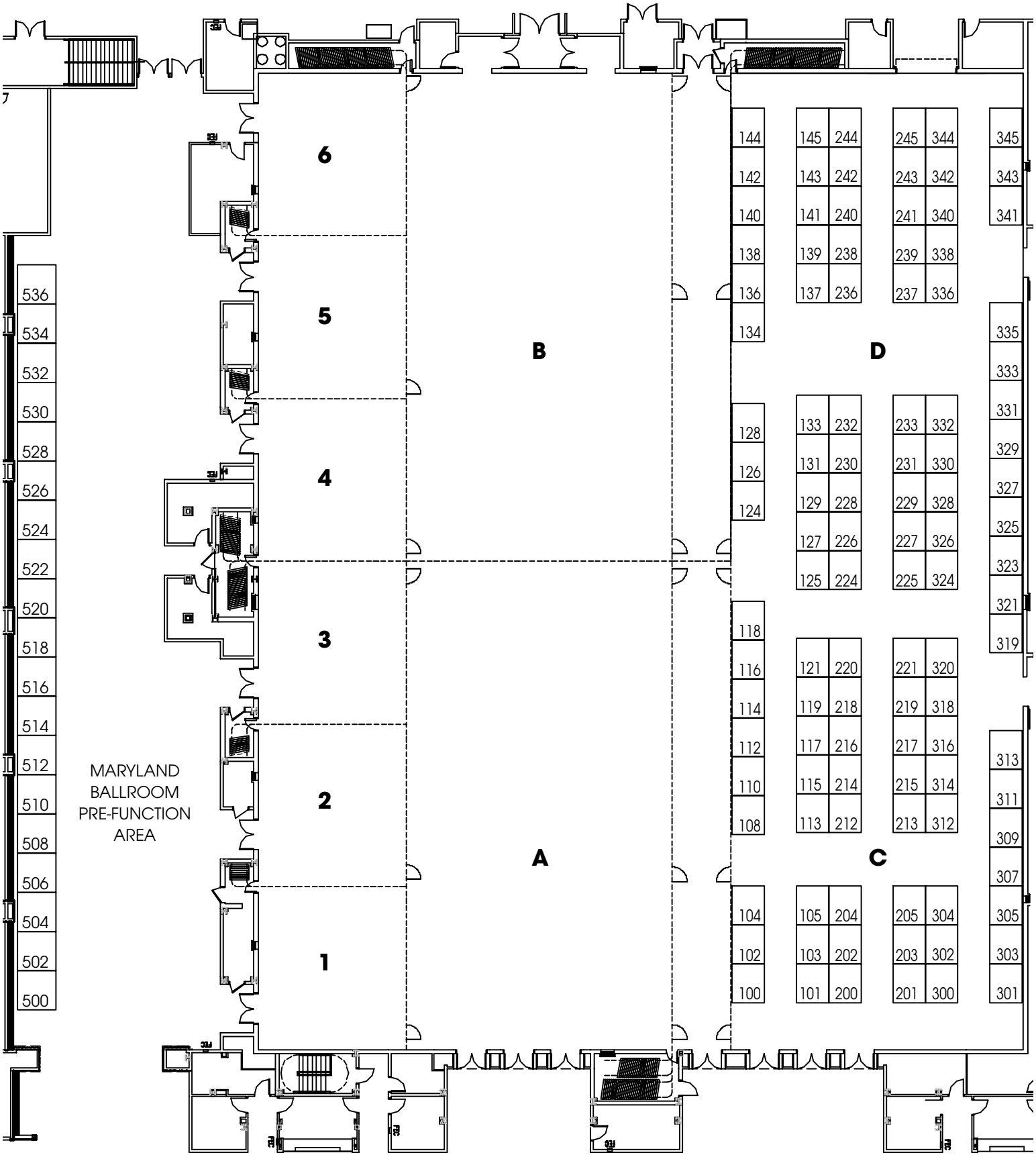
ARPA-E Finalists

DOE, Partners & Sponsors

Showcase Submissions

Floor Plan

ENERGY INNOVATION SUMMIT



Maryland Ballroom Floor Plan

Technology Showcase Participants Alphabetically